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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/704,521	02/11/2010	Marshall Medoff	00102-1US	6312

89174 7590 10/18/2013

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ART UNIT	PAPER NUMBER
1651	

NOTIFICATION DATE	DELIVERY MODE
10/18/2013	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARSHALL MEDOFF and THOMAS CRAIG MASTERMAN

Appeal 2013-005388
Application 12/704,521
Technology Center 1600

Before TONI R. SCHEINER, DEMETRA J. MILLS, and
ULRIKE W. JENKS, *Administrative Patent Judges*.

MILLS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134. The Examiner has rejected the claims for obviousness. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF CASE

16. A method of making a product, comprising:

modifying a manufacturing facility that was built to produce ethanol exclusively from grain, or from corn sweetener, sucrose, or lactose by adding a lignocellulosic saccharification unit to the facility;

further modifying the manufacturing facility by adding electron beam irradiation equipment to the manufacturing facility;

transporting a lignocellulosic starting material to the modified manufacturing facility;

irradiating the lignocellulosic starting material by exposure to irradiation from the electron beam irradiation equipment, thereby producing an irradiated lignocellulosic material,

wherein the irradiated lignocellulosic material has a lower level of recalcitrance that the lignocellulosic starting material;

converting the irradiated lignocellulosic material to a product by utilizing the lignocellulosic saccharification unit; thereby producing a product.

Cited References

Medoff	2007/0045456 A1	Mar. 1, 2007
Holm-Christensen et al.	WO 2007/009463 A2	Jan. 25 2007

James Fraser, *The Energy Blog, The Energy Revolution has begun and will change your lifestyle* (Nov. 21, 2006).

IAEA, *Radiation processing of polysaccharides*, IAEA-TECDOC-1422 (November 2004).

Wallace et al., *Feasibility Study for Co-Locating and Integrating Ethanol Production Plants from Corn Starch and Lignocellulosic Feedstocks*, USDA (2005) available at http://www.osti.gov/bridge

Grounds of Rejection

Claims 16-20, 32 and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Holm-Christensen, Fraser, and Medoff in view of IAEA.

Claims 16-20, 32, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wallace, Fraser, and Medoff in view of IAEA.

FINDINGS OF FACT

The Examiner's findings of fact are set forth in the Answer at pages 2-15.

Discussion

ISSUE

The Examiner concludes that Holm-Christensen teaches an apparatus and method for production of ethanol utilizing a cellulosic feedstock and teaches the claimed elements except 1) "Holm-Christensen does not specifically teach converting/modifying a facility which was once capable of producing ethanol exclusively from grain, or from corn sweetener," 2) "Holm-Christensen does not specifically teach the steps of adding the various equipment, used in the method of converting cellulosic/-lignocellulosic material to sugars and ethanol, to the production facility," and 3) "Holm-Christensen in view of Fraser does not specifically teach irradiation of the cellulosic or lignocellulosic material prior to or after transportation or exposure of the cellulosic or lignocellulosic material to electron beam radiation." (Ans. 4, 6.)

The Examiner relies on Fraser for showing

> conversion/modification of a conventional corn dry mill facility to a bio-refinery facility that utilizes cellulosic/lignocellulosic feedstocks to product sugar/ethanol products; thus one would have had a reasonable expectation of successfully converting or modifying a conventional corn dry mill facility to a bio-refinery facility that utilizes cellulosic/lignocellulosic feedstocks to

> produce sugar/ethanol products in the method of Holm-Christensen.

(Ans. 5.)

"Medoff teaches the fibrous material is sterilized by radiation such as infrared, ultraviolet or ionizing radiation, to kill microorganisms" (*id.* at 6) and IAEA teaches "radiation processing of cellulose pulp using electron beam processing. The process uses the electron beam treatment to reduce the degree of polymerization (i.e. *reduce recalcitrance*) of the cellulosic material" (*id.* at 7). The Examiner essentially finds that it would have been obvious to use electron beam radiation in place of the other forms of radiation used in the process of Medoff.

Appellants argue that

> it is not predictable that lignocellulosic material will behave the same way as cellulosic material described in the IAEA reference. Lignocellulosic material comprises crystalline cellulose fibrils embedded in a hemicellulose matrix, surrounded by lignin. This produces a compact matrix that is difficult to access by enzymes and other chemical, biochemical and biological processes, much more so than in cellulosic material. Furthermore, each type of lignocellulosic biomass has its own specific composition of cellulose, hemicellulose and lignin. It was not *a priori* predictable that electron beam radiation of lignocellulosic biomass would produce the desired results, that is, reduction of the recalcitrance of the material so that it could be saccharified.

(App. Br. 3.) Appellants further argue that, "none of the reports in the IAEA reference discuss irradiation followed by enzymatic treatment which is in contrast to the instant claims." *Id.* at 4.

The dispositive issue is: Does the cited prior art support the Examiner's rejection of the pending claims for obviousness by disclosing a step of "irradiating the lignocellulosic starting material by exposure to irradiation from the electron beam irradiation equipment, thereby producing an irradiated lignocellulosic material, wherein the irradiated lignocellulosic material has a lower level of recalcitrance that the lignocellulosic starting material"?

PRINCIPLES OF LAW

In making our determination, we apply the preponderance of the evidence standard. *See, e.g., Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

"In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant." *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993) (citations omitted). In order to determine whether a prima facie case of obviousness has been established, we consider the factors set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966): (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the relevant art; and (4) objective evidence of nonobviousness, if present.

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

"Attorney's argument in a brief cannot take the place of evidence." *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974).

ANALYSIS

Appellants present similar arguments in the brief for both obviousness rejections (with Holm-Christensen and Wallace as alternative primary references and the same cited secondary references). (App. Br. 2.) For this reason, we address both rejections together. We agree with the Examiner's fact finding, statement of the rejection, and responses to Appellants' arguments as set forth in the Answer. We find that the Examiner has provided evidence to support a prima facie case of obviousness. We provide the following additional comment to the arguments set forth in the Answer.

Appellants argue that it is not predictable that lignocellulosic material will behave the same way as cellulosic material described in the IAEA reference. However, "[a]ttorney's argument in a brief cannot take the place of evidence." *In re Pearson*, 494 F.2d at 1405. Appellants provide no evidence to support the argument that it is not predictable that lignocellulosic material will behave the same way as cellulosic material described in the IAEA reference. Therefore we agree with the Examiner's argument set forth on page 16 of the Answer that

> reducing the degree of polymerization of cellulose (i.e. reducing the number of monomeric units in a polymer) assists in changing the polymer structure and reducing the degree of polymerization provides a reduction in monomeric units thus reducing the cellulosic polymer size which would be beneficial for saccharifiying and fermenting since the smaller the sugar molecules the easier it is to ferment and produce the end product. Thus one of ordinary skill would have had a

> reasonable expectation of successfully reducing the feedstock recalcitrance by reducing the degree of cellulose polymerization and reducing microbial contamination prior to enzyme saccharification.

(Ans. 16-17.)

Appellants further argue that "none of the reports in the IAEA reference discuss irradiation followed by enzymatic treatment which is in contrast to the instant claims." (App. Br. 4.) However, Appellants err in attacking the references individually, as the rejection is based on a combination of references. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). The references cannot be read in isolation, but for what they teach in combination with the prior art as a whole. *See id*. The Examiner indicates on page 17 of the record, that it is Medoff that teaches the claimed order of steps, and that IAEA is relied on solely to support thatapplication of electron beam radiation to cellulose containing material results in reduction of the degree of cellulose polymerization, thus reducing the recalcitrance of the lignocellulosic feedstock.

Appellants provide no Reply Brief and therefore no response to the Examiner's arguments.

In view of the above, the obviousness rejections are affirmed for the reasons of record.

CONCLUSION OF LAW

The cited references support the Examiner's obviousness rejections, which have not been rebutted by Appellants by a preponderance of the evidence. The obviousness rejections are affirmed for the reasons of record.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

cdc